

Sponge vs excision technique for carcass sampling of beef, lamb and pig – Influence on process hygiene criteria and monitoring

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According to EU regulations meat operators must comply with process hygiene criteria, specified for carcasses in terms of daily mean log cfu/cm² of Aerobic colony count (ACC) and Enterobacteriaceae (ENT). These limits shall apply only to carcass sampled by excision, but other sampling methods may be used if it can be demonstrated to the satisfaction of the competent authority that it provides at least equivalent guarantees. The present study was undertaken to evaluate for beef, sheep and pig carcasses (i) the effectiveness of two types of sponge swabbing for the enumeration of ACC and ENT in comparison to excision sampling, (ii) the consequences on the evaluation of process hygiene counts and the determination of alternative microbial limits, and (iii) the impact of the change of method on the hygiene monitoring of the slaughtering process.

Materials and methods

- 405 carcasses were sampled before chilling in 9 French commercial slaughterhouses : 3 slaughterhouses / species (beef, sheep and pig), series of 5 carcasses sampled by 3 operators / slaughterhouse, 3 different production days / operator.
- On each half carcass triangular incisions of 12.5 cm² were excised from the surface of the 4 sampled sites, and the adjoining surfaces of 100 cm² swabbed, with standard (a) or stick (b) cellulose sponge.
- Aerobic colony counts [ISO 4833] and Enterobacteriaceae [ISO 21528-2] were enumerated (thresholds of 0 and -0.9 log cfu/cm² for excision and sponge swabbing). Daily mean log of series of 5 carcasses were not calculated if more than 2 individual carcass values were below these limits.



Results

Table 1: Average daily mean log of bacterial indicator, according to animal species and sampling method

Bacterial indicator Species \Sampling	ACC*			ENT*		
	Excision	Standard sponge	Stick sponge	Excision	Standard sponge	Stick sponge
Beef	2.79 [0.48]	1.61 [0.33]	1.89 [0.26]	0.72 [0.48]	-0.71 [0.08]	-0.50 [0.30]
Sheep	3.42 [0.38]	2.34 [0.42]	2.64 [0.45]	0.52 [0.22]	-0.04 [0.53]	-0.26 [0.36]
Pig	3.64 [0.30]	2.29 [0.32]	2.65 [0.36]	1.48 [0.48]	0.03 [0.49]	0.42 [0.66]

* average daily mean log cfu/cm²; [standard deviation]

- Sponge swabbing of ENT daily mean log could not be calculated for 76% of beef data, 52% for sheep, and 2% for pig.
- The average difference of regulatory daily mean log between the excision and the sponge swabbing methods was -1.07 log ufc/cm² [SD=0.47].
- Limited but significant effect of animal species and sponge type on the differences of daily mean log between excision and sponging methods.
- No significant effect of the sampling operator despite practical difficulties for the standardization of non-destructive methods

Conclusions

- Sponge swabbing, a non-destructive method, underestimated the daily mean bacterial counts of approximately 1.1 log in comparison to excision. This underestimation is more important than previously published results calculated on individual data, or than values used in some Member States to assess carcass hygiene criteria.
- Implications for the determination of alternative ACC and ENT limits for regulatory carcasses hygiene criteria are currently in discussion with the French Directorate General for Food.
- Sponge swabbing may not be adequate for the hygiene slaughtering process monitoring with control charts using ACC and ENT daily mean log.

